Section I. (Amendment to the Claims)

Please amend claims 32, 55 and 62, and cancel claims 61 and 72, as set out below in the following listing of claims 1-73 of the application.

1.-31. (Cancelled)

32. (Currently Amended) A method for *in-situ* generation of fluorine radicals and/or fluorine-containing interhalogen compounds for use in cleaning a semiconductor processing chamber, comprising the steps of:

(a) providing a fluorine source for supplying fluorine gas;

(b) providing a halogen source for supplying at least one halogen species selected from the group consisting of Cl_2, Br_2, and I_2;

wherein said method is characterized by at least one of the following sequences (I), (II), and (III) of steps:

(I) (i) flowing the fluorine gas and the halogen species from said respective sources therefor into a semiconductor processing chamber communicatively connected with said sources, without any intervening holdup of said fluorine gas and halogen species between the respective sources and the semiconductor processing chamber; and

(ii) generating the fluorine radicals and/or fluorine-containing interhalogen compounds by introducing external energy from an energy source into the semiconductor processing chamber containing the fluorine gas and the halogen species;

(II) (i) providing a diluent gas source for supplying at least one inert gas;

(ii) flowing the fluorine gas and the halogen species into ~~a~~ the semiconductor processing chamber communicatively connected with the fluorine source and the halogen source;

(iii) generating the fluorine radicals and/or fluorine-containing interhalogen compounds by introducing external energy from an energy source into the semiconductor processing chamber containing the fluorine gas and the halogen species; and

(iv) flowing the diluent gas into the semiconductor processing chamber to dilute the fluorine radicals and/or fluorine-containing interhalogen compounds contained therein; and

(III) (i) flowing the fluorine gas and the halogen species into a mixing chamber communicatively connected with the fluorine source and the halogen source;

(ii) generating the fluorine radicals and/or fluorine-containing interhalogen compounds by introducing external energy from an energy source into the mixing chamber containing the fluorine gas and the halogen species;

(iii) flowing the generated fluorine radicals and/or fluorine-containing interhalogen compounds from the mixing chamber into a holding chamber for storage until a pre-determined pressure threshold is reached; and

(iv) flowing the generated fluorine radicals and/or fluorine-containing interhalogen compounds from the holding chamber into the semiconductor processing chamber to effect cleaning therein, wherein the flow rate of the formed fluorine radicals and/or fluorine-containing interhalogen compounds from the holding chamber into the semiconductor processing chamber is monitored and controlled.

33. (Previously Presented) The method of claim 32, wherein the fluorine-containing interhalogen compounds have a general formula XF_n, and wherein X = Cl, Br, or I, and n = 1, 3, 5, or 7.

34. (Original) The method of claim 32, wherein the energy source supplies photoenergy.

35. (Original) The method of claim 32, wherein the energy source supplies ultraviolet light.

36. (Original) The method of claim 35, wherein the ultraviolet light has a wavelength in the range from about 100 nm to about 400 nm.

37. (Original) The method of claim 32, wherein the energy source is selected from the group consisting of hydrogen lamps, deuterium lamps, xenon discharge lamps, electric arcs, discharge tubes, incandescent devices, flash tubes, and pulsed lasers.

38. (Original) The method of claim 32, wherein the energy source supplies thermal energy.

39. (Previously Presented) The method of claim 32, comprising sequence (I) or (II), wherein the fluorine gas and the halogen species are separately flowed into the semiconductor processing chamber and mixed therein to form the fluorine radicals and/or fluorine-containing interhalogen compounds.

40. (Previously Presented) The method of claim 32, wherein the semiconductor processing chamber is equipped with temperature monitoring and controlling devices.

41. (Previously Presented) The method of claim 32, wherein temperature in the semiconductor processing chamber is in a range of from about room temperature to about 350°C.

42. (Previously Presented) The method of claim 32, wherein temperature in the semiconductor processing chamber is in a range of from about room temperature to about 100°C.

43. (Previously Presented) The method of claim 32, wherein temperature within the semiconductor processing chamber is in a range of from about 280°C to about 350°C.

44. (Previously Presented) The method of claim 32, wherein the semiconductor processing chamber is equipped with pressure monitoring and controlling devices.

45. (Previously Presented) The method of claim 44, wherein pressure in the semiconductor processing chamber is in a range of from about 1 Torr to about 1000 Torr.

46. (Previously Presented) The method of claim 32, comprising sequence (I) or (II), wherein the fluorine gas and the halogen species are mixed in a fluid delivery conduit before entering the semiconductor processing chamber.

47. (Cancelled)

48. (Previously Presented) The method of claim 32, comprising sequence (III), wherein the mixing chamber is equipped with temperature monitoring and controlling devices.

49. (Previously Presented) The method of claim 32, comprising sequence (III), wherein temperature in the mixing chamber is in a range of from about room temperature to about 350°C.

50. (Previously Presented) The method of claim 32, comprising sequence (III), wherein temperature in the mixing chamber is in a range of from about room temperature to about 100°C.

51. (Previously Presented) The method of claim 32, comprising sequence (III), wherein temperature within the mixing chamber is in a range of from about 280°C to about 350°C.

52. (Previously Presented) The method of claim 32, comprising sequence (III), wherein the mixing chamber is equipped with pressure monitoring and controlling devices.

53. (Previously Presented) The method of claim 32, comprising sequence (III), wherein pressure in the mixing chamber is in a range of from about 1 Torr to about 1000 Torr.

54. (Cancelled)

55. (Currently Amended) A method for *in-situ* generation of fluorine radicals and/or fluorine-containing interhalogen compounds for use in cleaning a semiconductor processing chamber, comprising the steps of:

(a) providing a fluorine source for supplying fluorine gas;

(b) providing a halogen source for supplying at least one halogen species selected from the group consisting of Cl_2, Br_2, and I_2;

(c) flowing the fluorine gas and the halogen species into a mixing chamber communicatively connected with the fluorine source and the halogen source;

(d) generating the fluorine radicals and/or fluorine-containing interhalogen compounds by introducing external energy from an energy source into the mixing chamber containing the fluorine gas and the halogen species;

(e) flowing the generated fluorine radicals and/or fluorine-containing interhalogen compounds from the mixing chamber into a holding chamber for storage until a pre-determined pressure threshold is reached; and

(f) flowing the generated fluorine radicals and/or fluorine-containing interhalogen compounds from the holding chamber into the semiconductor processing chamber to effect cleaning therein, wherein the flow rate of the formed fluorine radicals and/or fluorine-containing interhalogen compounds from the holding chamber into the semiconductor processing chamber is monitored and controlled.

56. (Previously Presented) The method of claim 32, comprising sequence (III), wherein said holding chamber is equipped with a mass flow controller.

57. (Previously Presented) The method of claim 32, further comprising the step of flowing an effluent gas stream discharged by said semiconductor processing chamber into a downstream exhaust/abatement system.

58. (Previously Presented) The method of claim 32, further providing at least one bypassing line for flowing the fluorine gas and halogen species, either separately or in mixture, without passing through the semiconductor processing chamber.

59. (Previously Presented) The method of claim 32, comprising sequence (I) or (III), further comprising supplying an inert gas from a diluent gas source connected with the semiconductor processing chamber, to dilute the generated fluorine radicals and/or fluorine-containing interhalogen compounds.

60. (Original) The method of claim 59, wherein the inert gas supplied by said diluent gas source comprises at least one gas species selected from the group consisting of Ar, He, and N_2.

61. (Cancelled)

62. (Currently Amended) A method for generating chlorine trifluoride, comprising the steps of:

(a) providing a fluorine gas source;

(b) providing a chlorine gas source;

(c) flowing fluorine gas and chlorine gas from said gas sources into a semiconductor processing chamber; and

(d) supplying photoenergy to said processing chamber from a photoenergy source to facilitate generation of chlorine trifluoride in ~~such~~ the semiconductor processing chamber.

63.-65. (Cancelled)

66. (Previously Presented) A method for generating fluorine radicals and/or fluorine-containing interhalogen compounds, comprising the steps of

(i) providing a fluorine source for supplying fluorine gas;

(ii) providing a halogen source for supplying at least one halogen species other than fluorine;

(iii) providing a diluent source for supplying a relatively inert gas;

(iv) mixing fluorine with said halogen species in an enclosure;

(v) supplying photoenergy to said enclosure from a photoenergy source to facilitate generation of the fluorine radicals and/or fluorine-containing interhalogen compounds; and

(vi) supplying the inert gas to the enclosure to dilute the generated fluorine radicals and/or fluorine-containing interhalogen compounds.

67. (Original) The method of claim 66, wherein the fluorine-containing interhalogen compounds have a general formula XF_n, and wherein X = Cl, Br, or I, and n = 1, 3, 5, or 7.

68. (Original) The method of claim 66, wherein the photoenergy supplied by said photoenergy source comprises ultraviolet light.

69. (Previously Presented) A method for *in-situ* generation of fluorine radicals and/or fluorine-containing interhalogen compounds for use in cleaning a semiconductor processing chamber, comprising the steps of:

(a) providing a fluorine source for supplying fluorine gas;

(b) providing a halogen source for supplying at least one halogen species selected from the group consisting of Cl_2, Br_2, and I_2;

(c) providing a diluent gas source for supplying at least one inert gas;

(d) flowing the fluorine gas and the halogen species into a mixing chamber communicatively connected with the fluorine source and the halogen source;

(e) generating the fluorine radicals and/or fluorine-containing interhalogen compounds by introducing external energy from an energy source into the mixing chamber containing the fluorine gas and the halogen species;

(f) flowing the fluorine radicals and/or fluorine-containing interhalogen compounds into the semiconductor processing chamber communicatively connected with the mixing chamber; and

(g) flowing the diluent gas into the semiconductor processing chamber to dilute the fluorine radicals and/or fluorine-containing interhalogen compounds contained therein.

70. (Previously Presented) The method of claim 69, further comprising the step of flowing the formed fluorine radicals and/or fluorine-containing interhalogen compounds into a holding chamber positioned between said mixing chamber and said semiconductor processing chamber before entering into the semiconductor processing chamber.

71. (Previously Presented) The method of claim 69, wherein the fluorine-containing interhalogen compounds have a general formula XF_n, and wherein X = Cl, Br, or I, and n = 1, 3, 5, or 7.

72. (Cancelled)

73. (Previously Presented) The method of claim 32, comprising sequence (III), wherein the fluorine gas and the halogen species are separately flowed into the mixing chamber and mixed therein to form the fluorine radicals and/or fluorine-containing interhalogen compounds.

Section II. (Amendments to the Drawings)

Please replace Figure 2 of the application, as submitted in response to the April 9, 2004 Office Action (as filed July 7, 2004), with the enclosed replacement sheet for Figure 2 (one sheet) contained in **Appendix A (Replacement Sheets of Drawings)** hereof.

The enclosed replacement sheet obviates the Examiner's objection to previously submitted Figure 2, wherein the applicants inadvertently connected the wrong components during drawing formalization.

The replacement drawing is of proper form, and its entry is respectfully requested.